Dr. Sharon M. Douglas
Department of Plant Pathology and Ecology
The Connecticut Agricultural Experiment Station
123 Huntington Street, P. O. Box 1106
New Haven, CT 06504

Phone: (203) 974-8601
Fax: (203) 974-8502
Email: Sharon.Douglas@ct.gov
Website: www.ct.gov/caes

Founded in 1875
Putting science to work for society

COMMON DISEASES OF MAPLE

There are a number of diseases that occur on maples throughout Connecticut every year although the severity and distribution of these problems vary with each season, each site, and each species. Diseases occur on maples in the landscape as well as those growing in natural woodlots and forests. Anthracnose, fungal leaf spots (including tar spot), powdery mildew, and Verticillium wilt are diseases that are usually encountered every year whereas leaf scorch is an occasional problem. The species of maple that we most frequently encounter in the Plant Disease Information Office are: *Acer palmatum* (Japanese maple), *A. platanoides* (Norway maple), *A. pseudoplatanus* (sycamore maple), *A. rubrum* (red or swamp maple), *A. saccharinum* (silver maple), and *A. saccharum* (sugar maple). The degree to which each species is affected by disease can be quite variable and is influenced by genetic factors, microclimate, and predisposition by other stresses (e.g., drought, excess water, winter injury).

I. ANTHRACNOSE:

Causal Agents: Several genera of fungi (e.g., *Aureobasidium*, *Discula*, *Kabatiella*).

Symptoms: The symptoms associated with anthracnose diseases vary with the species of maple and the fungus. Symptoms are often apparent from late spring to early summer but additional cycles of disease can result in damage which is visible later in the growing season. The range of symptoms includes leaf spots, blighted leaves and young shoots, cankers, and dieback of young twigs and branches. The most common symptoms are large, irregular dead areas on the leaf that are often V-shaped or delineated by the veins (Figures 1 and 2).

Figure 1. Typical anthracnose lesions delineated by the veination pattern of the leaves.

These areas can be tan and paper-thin. When infection is severe, the fungus enters the petioles and causes entire leaves to appear blighted, browned, and shriveled.

These symptoms are often confused with drought and heat stress since they are very similar. Significant leaf drop and premature defoliation can occur. Samaras can also develop necrotic or dead spots and drop prematurely.

Figure 2. Close-up of anthracnose lesion.

Management: Refer to management strategies for foliar diseases at the end of this section.

II. LEAF SPOTS and TAR SPOT:

Causal Agents: Several genera of fungi: leaf spots (e.g., *Septoria*, *Phyllosticta*, *Didymosporina*), tar spots (*Rhytisma acerinum*, *R. americanum*, and *R. punctatum*)

Symptoms: All species of maple are subject to attack by one or more leaf-spotting fungi. Symptoms usually appear in mid to late summer.

- **Leaf Spots:** Symptoms appear as circular to irregular spots approximately ¼ to 1 inch in diameter. Some spots have tan to brown centers and distinct purple-brown margins (sometimes referred to as a "frog-eye" symptom) whereas other spots are dark brown and have diffuse, concentric ring patterns and irregular margins (Figure 3). Small black fruiting bodies may be visible on the upper or lower surfaces of the spots. Spores of the fungi are often visible as tendrils oozing from the back fruiting bodies after periods of wet weather (Figure 4). These diseases are usually more severe on red, sugar, and silver maple but can occur on Japanese and Norway maple.

Figure 3. Septoria leaf spot of maple. Initial symptoms are small necrotic spots, which when numerous, can coalesce into large necrotic areas.

Figure 4. Close-up of tendril of oozing fungal spores (arrow) on abaxial surface of a leaf.

- **Tar Spot:** Symptoms first appear as inconspicuous, pale green to yellow

areas on the leaves. As the fungus grows within the leaf, these areas develop into distinctive, slightly raised, shiny, tar-like, black spots on the leaves (Figure 5). The size of the spot depends upon the fungal species; spots can be irregular and up to ½ inch in diameter (*R. acerinum*) or can appear as tiny, pinpoint dots (*R. punctatum*) (Figure 6). Significant premature fall coloration and defoliation can occur, especially when infection is heavy (as is often the situation on Norway maple).

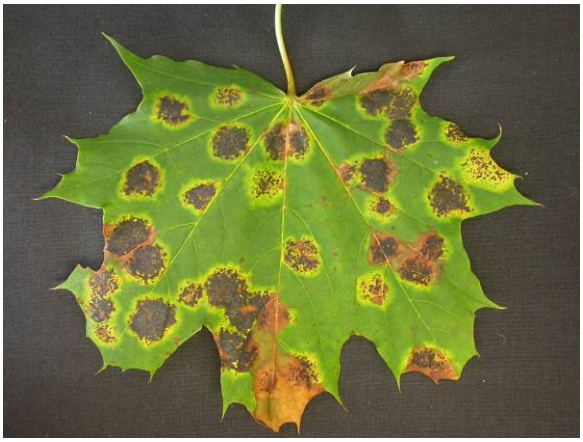

Figure 5. Tar spot on maple.

Figure 6. Close-up of the tar-like stroma of the fungus, *Rhytisma* spp.

Management: Refer to management strategies for foliar diseases at the end of this section.

III. POWDERY MILDEW:

Causal Agent: Several genera of fungi (e.g., *Erysiphe, Phyllactinia)*

Symptoms: Leaves develop a somewhat "dirty" appearance due to the presence of a white to grayish, powdery growth on the leaf surface (Figure 7). Symptoms are usually first evident on the upper surface of the leaf and can result in premature fall coloration. Unlike many other foliar diseases, powdery mildew typically develops late in the growing season. It can result in defoliation when infection is severe.

Figure 7. Diagnostic powdery growth on upper surface of a maple leaf.

Management: Refer to management strategies for foliar diseases at the end of this section.

Management Strategies for Foliar Diseases: Control of anthracnose, leaf spots, and powdery mildews can be achieved using a multifaceted approach. These diseases are often effectively controlled by following good sanitary and cultural practices and are rarely serious enough to warrant chemical control. Since many of these fungi overwinter on fallen leaves, it is important to rake and remove fallen leaves from the vicinity of the tree in

autumn. This reduces the number of spores available to infect emerging leaves in spring or during the following growing season. Tree vigor should also be maintained by proper watering, fertilizing, and pruning. Although foliar diseases are usually considered to be more aesthetic than life-threatening, there are situations where they can be serious and cause permanent damage or even tree death. Newly transplanted trees or trees weakened by stress are particularly sensitive to repeated defoliation. In such cases, chemical control can be beneficial. Among the fungicides registered for homeowner use in Connecticut are thiophanate-methyl, chlorothalonil, and mancozeb. The pesticide label will contain information on dosage rates, application intervals, and safety precautions. Since most of these fungi infect in spring as leaves are unfolding, the first fungicide spray is applied at budbreak. Two or three additional sprays are subsequently applied at 7-14 day intervals. Additional applications may also be necessary in unusually wet springs. For anthracnose and leaf spots, once symptoms are visible on the leaves it is too late for chemical control. (The exception to early season infections are the powdery mildews. They usually infect in mid-season so applications of fungicides for control would be applied as soon as symptoms are visible.)

IV. VERTICILLIUM WILT:

Causal Agent: *Verticillium* spp.

Symptoms: Symptoms of Verticillium wilt first appear as a yellowing or wilting of individual limbs or portions of the canopy (often referred to as "flagging") (Figures 8 and 9). This usually occurs in mid-summer, frequently after periods of hot, dry weather. The fungus enters the roots and grows into the water transport system (xylem) of the tree where it restricts the movement of water and nutrients within the tree. Infected trees often have sparse canopies consisting of undersized, off-colored leaves. These trees sometimes produce heavy crops of seeds or samaras. A diagnostic characteristic of this disease is a distinctive olive-brown streaking, which may be evident in the wood of symptomatic branches or twigs (Figure 10).

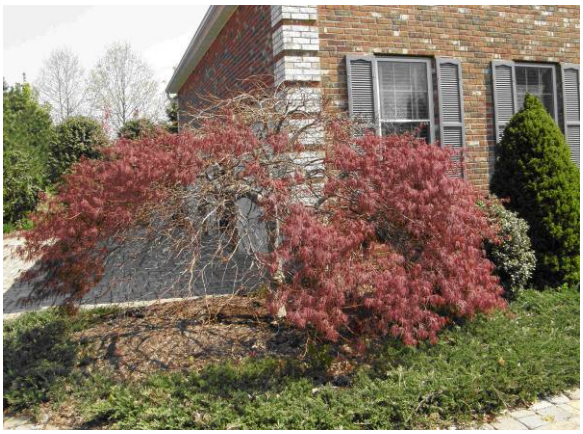

Figure 8. Japanese maple with acute symptoms of Verticillium wilt.

Figure 9. Maple with a portion of the canopy exhibiting premature fall coloration.

Infected trees die slowly or suddenly, depending upon the extent of infection and the overall health of the tree. Trees weakened by drought or root damage are thought to be more prone to disease.

Figure 10. .Diagnostic vascular discoloration in sapwood of maple infected with Verticillium wilt.

Management Strategies for Verticillium Wilt: There are no satisfactory controls for this disease of maple once trees are infected. However, efforts to maintain tree health and vigor can help to prolong the life of the tree. It is helpful to prune affected limbs as soon as symptoms are evident. This helps to minimize secondary invaders and opportunistic pests. Tools should be disinfested between cuts with a 10% solution of household bleach or 70% alcohol. Additional efforts to promote tree vigor by watering, fertilizing (only as necessary, based on a soil test) and avoiding other types of stress are helpful. Since the fungus is soil-borne, it is necessary to avoid planting susceptible species in the area. A list of resistant species can be found in Table 1 at the end of this fact sheet.

V. SCORCH:

Causal Factors: Drought and heat stress

Symptoms: Symptoms usually develop after periods of hot, dry weather in July and August. Leaves appear curled at the edges and cupped; they may develop brown, necrotic or dead margins (Figures 11, 12, and 13).

Figure 11. Japanese maple leaves with marginal scorch symptoms

Figure 12. Marginal scorch.

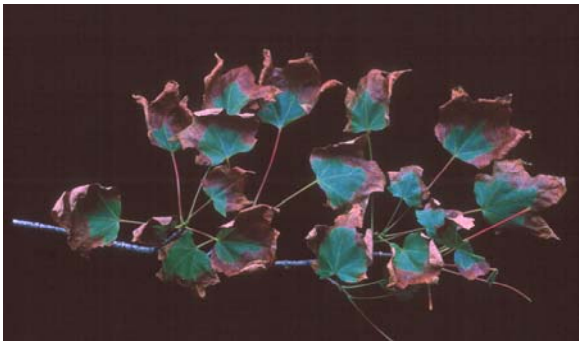

Figure 13. Characteristic marginal scorch symptoms.

Leaves also shrivel and drop prematurely. Since the symptoms can be confused with those associated with anthracnose, careful examination is necessary for accurate diagnosis.

Management Strategies for Scorch: Although the weather can't be controlled and there are no "cures" once the damage is done, there are steps that can minimize the effects of scorch. These include maintaining optimum growth and vigor by watering during periods of drought, fertilizing at the proper time to avoid growth late in the season that may not harden-off properly for the winter, and pruning to remove dead twigs or branches to minimize secondary invaders or opportunistic pests.

Table 1. Resistance of Selected Woody Ornamentals to Verticillium Wilt

Resistant or Immune	Susceptible
Apple *(Malus)*	Ash *(Fraxinus)*
Arborvitae *(Thuja)*	Azalea *(Rhododendron)*
Beech *(Fagus)*	Barberry *(Berberis)*
Birch *(Betula)*	Black Locust *(Robinia)*
Boxwood *(Buxus)*	Box Elder *(Acer negundo)*
Butternut *(Juglans)*	Boxwood *(Buxus)*
Crabapple *(Malus)*	Catalpa *(Catalpa)*
Dogwood *(Cornus)**	Cherry, other stone fruits *(Prunus)*
Fir *(Abies)*	Coffee tree, Kentucky *(Gymnocladus)*
Firethorn *(Pyracantha)*	Currant *(Ribes)*
Gingko *(Gingko)*	Dogwood *(Cornus)**
Hackberry *(Celtis)*	Elm *(Ulmus)*
Hawthorn *(Crataegus)*	Honeysuckle *(Lonicera)*
Hickory *(Carya)*	Lilac *(Syringa)*
Holly *(Ilex)*	Linden *(Tilia)**
Honey Locust *(Gleditsia)*	Magnolia *(Magnolia)*
Hornbeam *(Carpinus)*	Maple *(Acer)*
Juniper *(Juniperus)*	Redbud *(Cercis)*
Katsura tree *(Cercidiphyllum)*	Rose *(Rosa)*
Larch *(Larix)*	Russian Olive *(Elaeagnus)*
Linden *(Tilia)**	Serviceberry *(Amelanchier)**
Mountain Ash *(Sorbus)*	Smoke tree *(Cotinus)*
Mulberry *(Morus)*	Spirea *(Spirea)*
Oak *(Quercus)*	Sumac *(Rhus)*
Pear *(Pyrus)*	Viburnum *(Viburnum)*
Pine *(Pinus)*	Weigela *(Weigela)*
Poplar *(Populus)*	Yellowwood *(Cladratis)*
Serviceberry *(Amelanchier)**	
Spruce *(Picea)*	
Sweet Gum *(Liquidambar)*	
Sycamore *(Platanus)*	
Walnut *(Juglans)*	
Willow *(Salix)*	
Yew *(Taxus)*	

* The resistance or susceptibility of these plants will depend upon the cultivar of the tree and the strain of *Verticillium* present in the soil.

July 2009 (revised)